UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,399	10/30/2003	Supratik Guha	YOR920030425US1	3291

23334 7590 12/04/2006

FLEIT, KAIN, GIBBONS, GUTMAN, BONGINI
& BIANCO P.L.
ONE BOCA COMMERCE CENTER
551 NORTHWEST 77TH STREET, SUITE 111
BOCA RATON, FL 33487

EXAMINER	
JAGAN, MIRELLYS	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 12/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/699,399	GUHA ET AL.	
	Examiner	Art Unit	
	Mirellys Jagan	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-7,9-12,15-19,21-23,29 and 30* is/are pending in the application.

4a) Of the above claim(s) *11,12 and 23* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-7,9,10,15-19,21,22,29 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 3, 4, 7, 9, 10, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,140,141 to Davidson in view of U.S. Patent 6,251,706 to Paniccia.

Davidson discloses a system comprising:

a duct adapted to be coupled with an electronic device, wherein the duct forms one side of the duct;

a coolant flowing through the duct so as to cool the electronic device; and

a photon detector (radiation detector 145) located adjacent to the duct for detecting photons emitted from the electronic device;

wherein the duct and coolant are at least partially transparent to photons with wavelengths above 3.6 microns (greater or equal to 1 micron, see column 2, lines 58-60); the coolant is either water or a perfluorocarbon; the duct comprises a window; and the device includes a protecting outer layer (is packaged) (see figures 2 and 3; column 2, line 30-column 3, line 2; and column 3, lines 39-49).

Furthermore, Davidson discloses that photon detector detects the photons from the device during operation of the device under conditions for which the device is designed, and uses the detected photons to determine the voltages of the device.

Davidson does not disclose the duct being made of at least one of polished silicon, quartz, sapphire, glass, and diamond; and the system comprising a processor coupled to the photon detector for generating a thermal distribution of the device based on the information from the photon detector, wherein the photon detector captures thermal information from the device during operation of the device under conditions for which it is designed, the photon detector being an IR camera.

However, Paniccia discloses a system for testing an electronic device during operation by detecting photons (IR radiation) from the device through an IR-transparent window (520) made of diamond, silicon, or sapphire that is coupled to the device (502). The material of the window is thermally conductive, and is chosen depending on the heat removal requirements of the device (see column 5, lines 51-65). A photon detector comprising an IR camera (760) is located adjacent the device to detect the photons emitted by the device for use by its processor in

generating a thermal distribution (thermal map) of the device, the camera capturing thermal information from the device during operation of the device under conditions for which the device is designed. Paniccia discloses that it is known in the art to determine the voltage levels of the device as well as thermal information of the device by detecting photon emissions from the device when testing the device at its operating capacity, and that the IR camera (760) of his embodiment can determine the voltage levels of the device as well as thermal information. The thermal information is important since it allows proper thermal regulation of the device to prevent thermal degradation (see figure 7D; column 1, line 66-column 2, line 9; column 2, lines 26-35 and 43-55; and column 7, lines 13-37).

Referring to claim 7, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Davidson by replacing the window with a window as taught by Paniccia, in order to provide a window having a desired thermal conductivity to remove heat depending on the heat removal requirements of a particular application, and since the particular type of material used to make the window is only considered to be the use of a "preferred" or "optimum" material out of a plurality of well known materials that a person having ordinary skill in the art at the time the invention was made would have been able to provide based on the intended use of applicant's apparatus, i.e., suitability for the intended use of applicant's apparatus, which in this case is to provide a window that is partially transparent to photons with wavelengths above 3.6 microns, as taught by Davidson and Paniccia. See *In re Leshin*, 125 USPQ 416 (CCPA 1960), where the courts held that a selection of a material on the basis of suitability for intended use of an apparatus would be entirely obvious.

Referring to claims 3, 9, and 10, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Davidson and Paniccia by replacing the photon detector with a photon detector as taught by Paniccia, in order to also determine the thermal characteristics and generate a thermal map of the device from the detected photons to prevent thermal degradation.

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson and Paniccia, as applied to claims 3, 4, 7, 9, 10, and 29 above, and further in view of U.S. Patent 5,349,499 to Yamada et al [hereinafter Yamada].

Davidson and Paniccia disclose a system having all of the limitations of claims 5 and 6, as stated above in paragraph 3, but is silent as to the type of perfluorocarbon used, and therefore does not explicitly disclose the coolant being one of alkanes and perfluoroalkanes, or one of perfluorooctane, perfluorohexane, octane, hexane, and carbon tetrachloride.

However, Yamada discloses that perfluorooctanes and perfluorohexanes are known perfluorocarbons used as liquid coolants for semiconductor devices, and that other perfluorocarbons having the formula CnF_{n+2} are also useful as liquid coolants for cooling electronic devices (see column 1, line 58-column 2, line 2; and claim 9).

Referring to claim 5, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Davidson and Paniccia by using perfluoroalkanes as the liquid coolant since perfluoroalkanes have a molecular formula of $C_{24}F_{50}$, and Yamada teaches that perfluorocarbons having the molecular formula C_nF_{n+2} are useful as liquid coolants for use in cooling electronic devices.

Referring to claim 6, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system disclosed by Davidson and Paniccia by using perfluorooctanes or perfluorohexanes as the perfluorocarbon, since Yamada teaches that these are known useful liquid coolants for use in cooling electronic devices.

5. Claims 15, 16, 19, 21, 22, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson in view of Paniccia.

Davidson discloses a method for detecting photons (IR radiation) of an electronic device during operation, the method comprising:

detecting photons from an electronic device during operation of the electronic device using a photon detector (IR radiation detector 145), and the photon detector is adjacent to a duct comprising a window that is adjacent to the electronic device;

wherein the photons are indicative of a thermal characteristic of the electronic device (infrared radiation is thermal radiation and therefore indicative of temperature); the electronic device forms one side of the duct and a coolant comprising water or a perfluorocarbon flows through the duct so as to cool the electronic device; the duct and the coolant are at least partially transparent to photons with wavelengths above 3.6 microns (greater or equal to 1 micron, see column 2, lines 58-60); the photon detector captures the photons from the device during operation of the device under conditions for which it is designed; and the device includes a protecting outer layer (is packaged) (see figures 2 and 3; column 2, line 30-column 3, line 2; and column 3, lines 39-49).

Davidson discloses the method using the detected photons to determine the voltages of the device, but does not disclose the photons being used to detect a thermal characteristic of the device; the duct being made of at least one of polished silicon, quartz, sapphire, glass, and diamond; generating a thermal distribution of the device based on information from the photon detector; and the photon detector being an IR camera.

However, Paniccia discloses a system for testing an electronic device during operation by detecting photons (IR radiation) from the device through an IR-transparent window (520) made of diamond, silicon, or sapphire that is coupled to the device (502). The material of the window is thermally conductive, and is chosen depending on the heat removal requirements of the device (see column 5, lines 51-65). A photon detector comprising an IR camera (760) is located adjacent the device to detect the photons emitted by the device for use in generating a thermal distribution (thermal map) of the device, the camera capturing thermal information from the device during operation of the device under conditions for which the device is designed. Paniccia discloses that it is known in the art to determine the voltage levels of the device as well as thermal information of the device by detecting photon emissions from the device when testing the device at its operating capacity, and that the IR camera (760) of his embodiment can determine the voltage levels of the device as well as thermal information. The thermal information is important since it allows proper thermal regulation of the device to prevent thermal degradation (see figure 7D; column 1, line 66-column 2, line 9; column 2, lines 26-35 and 43-55; and column 7, lines 13-37).

Referring to claim 19, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Davidson by replacing the

photon detector with a photon detector as taught by Paniccia in order to also determine the thermal characteristics and generate a thermal map/distribution of the device from the detected photons to prevent thermal degradation.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Davidson by replacing the window with a window as taught by Paniccia, in order to provide a window having a desired thermal conductivity to remove heat depending on the heat removal requirements of a particular application, and since the particular type of material used to make the window is only considered to be the use of a "preferred" or "optimum" material out of a plurality of well known materials that a person having ordinary skill in the art at the time the invention was made would have been able to provide based on the intended use of applicant's apparatus, i.e., suitability for the intended use of applicant's apparatus, which in this case is to provide a window that is partially transparent to photons with wavelengths above 3.6 microns, as taught by Davidson and Paniccia. See *In re Leshin*, 125 USPQ 416 (CCPA 1960), where the courts held that a selection of a material on the basis of suitability for intended use of an apparatus would be entirely obvious.

6. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson and Paniccia, as applied to claims 15, 16, 19, 21, 22, and 30 above, and further in view of Yamada.

Davidson and Paniccia disclose a method having all of the limitations of claims 17 and 18, as stated above in paragraph 7, but are silent as to the type perfluorocarbon used, and

therefore do not explicitly disclose the coolant being one of alkanes and perfluoroalkanes, or one of perfluorooctane, perfluorohexane, octane, hexane, and carbon tetrachloride.

However, Yamada discloses that perfluorooctanes and perfluorohexanes are known perfluorocarbons used as liquid coolants for semiconductor devices, and that other perfluorocarbons having the formula CnF_{n+2} are also useful as liquid coolants for cooling electronic devices (see column 1, line 58-column 2, line 2; and claim 9).

Referring to claim 17, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Davidson and Paniccia by using perfluoroalkanes as the liquid coolant since perfluoroalkanes have a molecular formula of $C_{24}F_{50}$, and Yamada teaches that perfluorocarbons having the molecular formula C_nF_{n+2} are useful as liquid coolants for use in cooling electronic devices.

Referring to claim 18, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method disclosed by Davidson and Paniccia by using perfluorooctanes or perfluorohexanes as the perfluorocarbon, since Yamada teaches that these are known useful liquid coolants for use in cooling electronic devices.

Response to Arguments

7. Applicant's arguments regarding claim 7, and the declaration under 37 CFR 1.132 filed 9/26/06 have been considered but are moot in view of the new ground(s) of rejection.

Referring to claim 19, Applicant's arguments that there is no reason to combine Davidson with Paniccia because Davidson is not directed to measuring thermal distributions of chips, and Paniccia does not show or suggest a cooling system that uses coolant flowing through a duct so

as to cool an electronic device, as recited in claim 19, are not persuasive because one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Furthermore, Applicant's arguments that there is no reason to take the IR transparent window material from Paniccia and exchange it for the upper window of a cooling duct in Davidson, or modify Paniccia in view of Davidson, are not persuasive because the rejections are not based on replacing the material of the Paniccia window with the material of the Davidson window. Instead, the rejections are based on replacing the material of Davidson's window with a material as taught by Paniccia, i.e., modifying Davidson in view of Paniccia.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

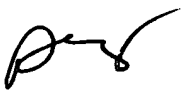
however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ
November 28, 2006



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800